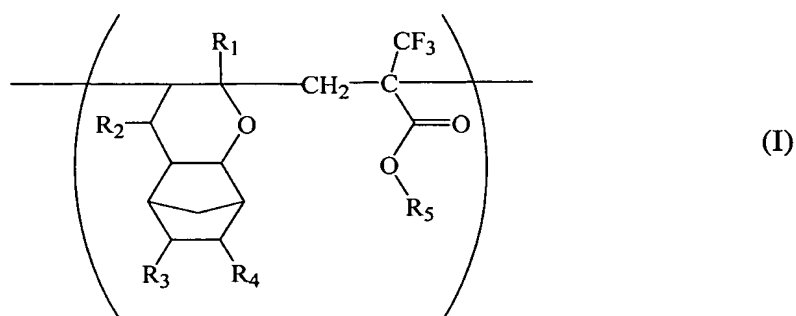


What is claimed is:

1. A photosensitive copolymer including an α -fluorinated acrylate monomer and an alkenyl ether monomer having the formula I



wherein

R_1 and R_2 are independently selected from a group consisting of hydrogen and methyl;

R_3 and R_4 are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

R_5 is selected from a group consisting of hydrogen, hydroxy, substituted and unsubstituted alkyls, substituted and unsubstituted cycloalkyls, substituted and unsubstituted alkoxy, substituted and unsubstituted heterocyclics, and acid labile groups;

further wherein

at least one of R_3 , R_4 and R_5 include an acid labile group.

2. A photosensitive copolymer according to claim 1, wherein:

the acid labile group is a hydrocarbon or a substituted hydrocarbon having at least 4 and no more than 20 carbon atoms.

3. A photosensitive copolymer according to claim 1, wherein:

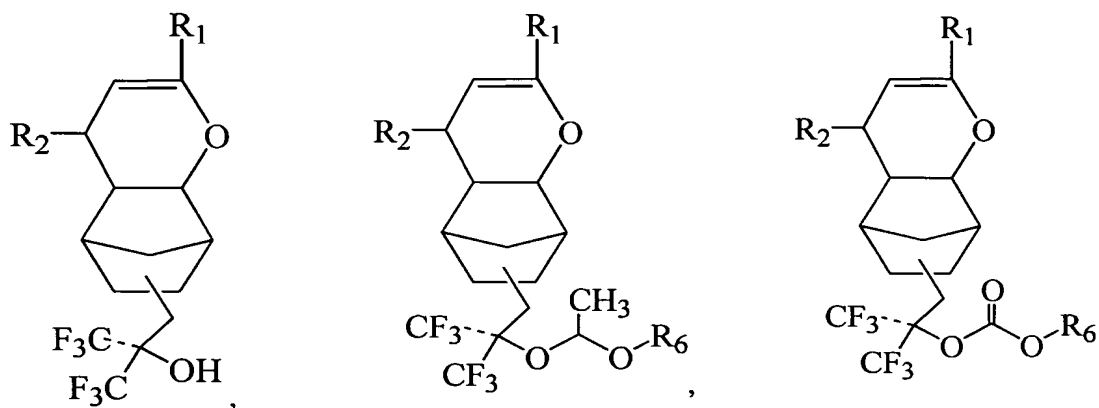
the copolymer includes an acid labile group selected from a group consisting of t-butyl, tetrahydropyranyl, and substituted or unsubstituted alicyclic hydrocarbons having 6-12 carbon atoms.

4. A photosensitive copolymer according to claim 1, wherein:

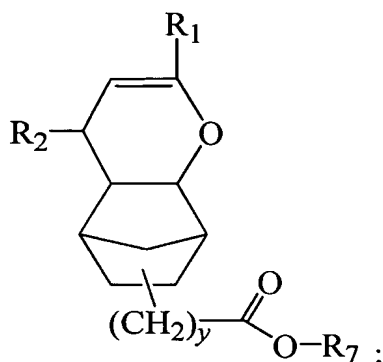
the copolymer includes an acid labile group selected from a group consisting of 1-methyl-1-cyclohexyl, 1-ethyl-1-cyclohexyl, 2-methyl-2-norbornyl, 2-ethyl-2-norbornyl, 2-methyl-2-isobornyl, 2-ethyl-2-isobornyl, 8-methyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 8-ethyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, 1-adamantyl-1-methylethyl, 2-methyl-2-fenchyl and 2-ethyl-2-fenchyl groups.

5. A photosensitive copolymer according to claim 1, wherein:

the copolymer includes an alkenyl ether monomer selected from the group consisting of alkenyl ether monomers represented by the formulas:



and



wherein

y is 0, 1 or 2;

R₆ is selected from a group consisting of alkyls and substituted alkyls having at least one and no more than 20 carbon atoms; and

R₇ is an acid labile group including a hydrocarbon or a substituted hydrocarbon having at least 4 and no more than 20 carbons.

6. A photosensitive copolymer according to claim 5, wherein:

R₇ is selected from a group consisting of t-butyl, substituted cyclohexyl, 1-methyl-1-cyclohexyl, 1-ethyl-1-cyclohexyl, 2-methyl-2-norbornyl, 2-ethyl-2-norbornyl, 2-methyl-2-isobornyl, 2-ethyl-2-isobornyl, 8-methyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 8-ethyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, 1-adamantyl-1-methylethyl, 2-methyl-2-fenchyl and 2-ethyl-2-fenchyl groups.

7. A photosensitive copolymer according to claim 1, wherein:

at least one half of the haloalkyls included in the copolymer are fluoralkyls.

8. A photosensitive copolymer according to claim 1, wherein:

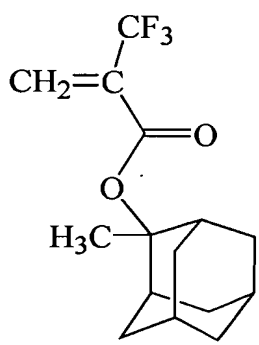
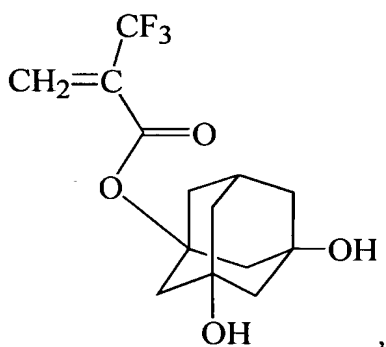
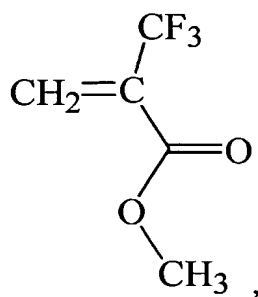
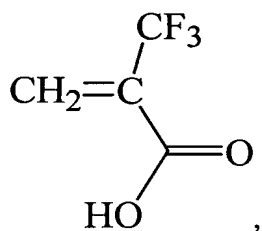
the copolymer has a Mw of between about 7,000 and 25,000; and
a polydispersity of between about 1.7 and about 2.5.

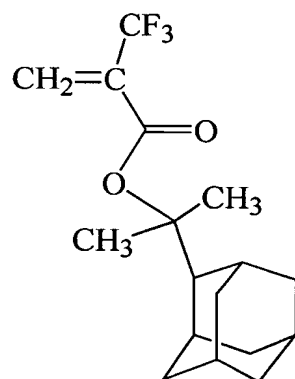
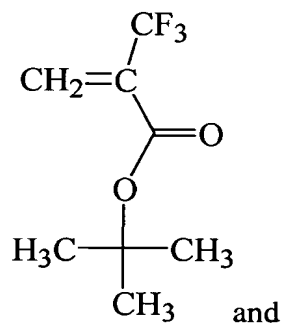
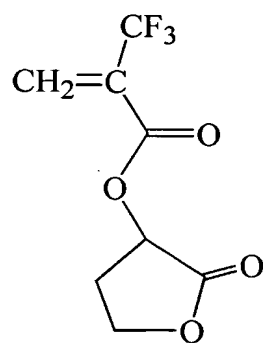
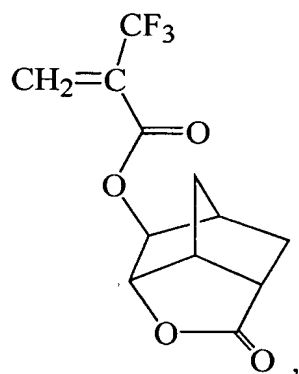
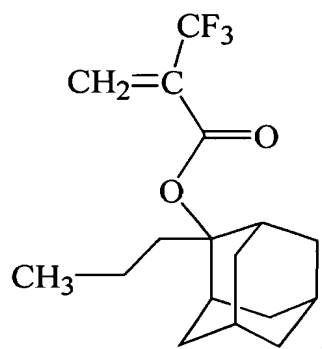
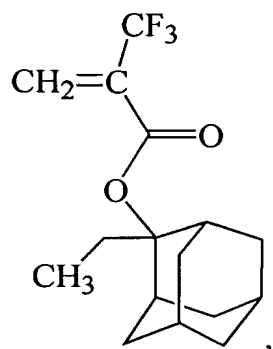
9. A photosensitive copolymer according to claim 1, wherein:

the copolymer has a Mw of between about 12,000 and 19,000; and
a polydispersity of between about 1.7 and about 2.5.

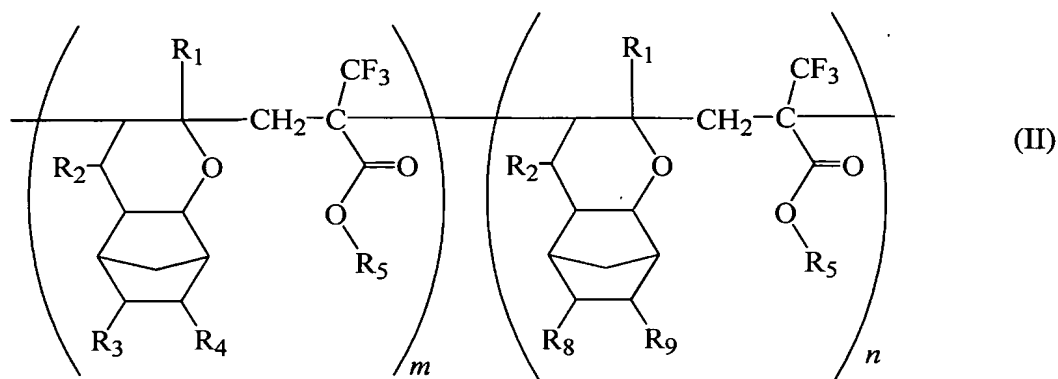
10. A photosensitive copolymer according to claim 1, wherein:

the copolymer includes a substituted or unsubstituted α -fluorinated acrylate monomer
selected from the group represented by the formulas:





11. A photosensitive terpolymer including an α -fluorinated acrylate monomer, a first alkenyl ether monomer and a second alkenyl ether monomer having the formula II



wherein

$m + n$ equals 1;

$0.01 \leq m / (m + n) \leq 0.8$;

R_1 and R_2 are independently selected from a group consisting of hydrogen and methyl;

R_3 , R_4 , R_8 and R_9 are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

R_5 is selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

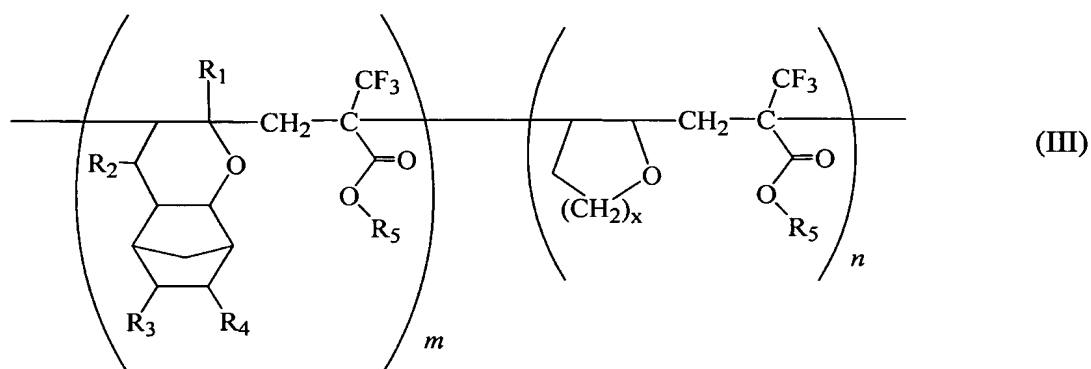
further wherein

the terpolymer includes at least one acid labile group and the first alkenyl ether monomer and the second alkenyl ether monomer are different.

12. A photosensitive terpolymer including an α -fluorinated acrylate monomer, a first alkenyl ether monomer and a second alkenyl ether monomer according to claim 11, wherein:

$m / (m + n)$ is between about 0.3 and 0.5.

13. A photosensitive terpolymer according to claim 11, wherein:
the acid labile group is selected from a group consisting of t-butyl, substituted cyclohexyl, 1-methyl-1-cyclohexyl, 1-ethyl-1-cyclohexyl, 2-methyl-2-norbornyl, 2-ethyl-2-norbornyl, 2-methyl-2-isobornyl, 2-ethyl-2-isobornyl, 8-methyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 8-ethyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, 1-adamantyl-1-methylethyl, 2-methyl-2-fenchyl and 2-ethyl-2-fenchyl groups.
14. A photosensitive copolymer according to claim 1, wherein:
at least one half of the haloalkyls included in the terpolymer are fluoralkyls.
15. A photosensitive terpolymer according to claim 11, wherein:
the terpolymer has a Mw of between about 8,000 and 25,000; and
a polydispersity of between about 1.6 and about 2.5.
16. A photosensitive terpolymer according to claim 11, wherein:
the terpolymer has a Mw of between about 10,000 and 15,000; and
a polydispersity of between about 1.8 and about 2.3.
17. A photosensitive terpolymer including an α -fluorinated acrylate monomer, an alkenyl ether monomer and a dihydropyran having the formula III



wherein

x is 1 or 2;

$m + n$ equals 1;

$0.01 \leq m / (m + n) \leq 0.8$; and wherein

R_1 and R_2 are independently selected from a group consisting of hydrogen and methyl;

R_3 and R_4 are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

R_5 is selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

further wherein

at least one of R_3 , R_4 and R_5 includes an acid labile group.

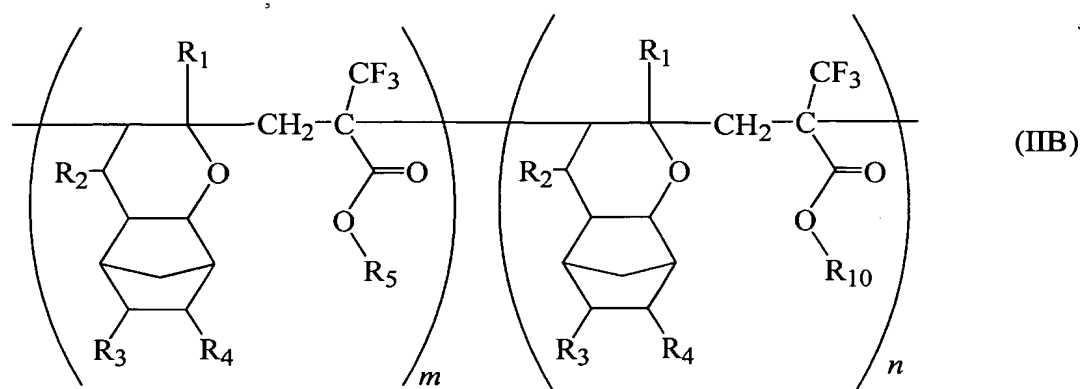
18. A photosensitive terpolymer according to claim 17, wherein:

$m / (m + n)$ is between about 0.3 and 0.5.

19. A photosensitive terpolymer according to claim 17, wherein:

the acid labile group is selected from a group consisting of t-butyl, substituted cyclohexyl, 1-methyl-1-cyclohexyl, 1-ethyl-1-cyclohexyl, 2-methyl-2-norbornyl, 2-ethyl-2-norbornyl, 2-methyl-2-isobornyl, 2-ethyl-2-isobornyl, 8-methyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 8-ethyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, 1-adamantyl-1-methylethyl, 2-methyl-2-fenchyl and 2-ethyl-2-fenchyl groups.

20. A photosensitive terpolymer according to claim 17, wherein:
at least one half of the haloalkyls included in the terpolymer are fluoralkyls.
21. A photosensitive terpolymer according to claim 17, wherein:
the terpolymer has a Mw of between about 8,000 and 25,000; and
a polydispersity of between about 1.6 and about 2.5.
22. A photosensitive terpolymer according to claim 17, wherein:
the terpolymer has a Mw of between about 10,000 and 15,000; and
a polydispersity of between about 1.8 and about 2.3.
23. A photosensitive terpolymer according to claim 17, wherein:
R₅ is selected from a group consisting of t-butyl, substituted cyclohexyl, 2-methyl-2-norbornyl, 2-methyl-2-isobornyl, 2-ethyl-2-isobornyl, 8-methyl-8-tricyclo[5.2.1.0^{2,6}] decanyl, 2-methyl-2-adamantyl and 2-ethyl-2-adamantyl.
24. A photosensitive terpolymer including first and second α -fluorinated acrylate monomers and an alkenyl ether monomer having the formula IIB



wherein

$m + n$ equals 1;

$0.01 \leq m / (m + n) \leq 0.8$

R_1 and R_2 are independently selected from a group consisting of hydrogen and methyl;

R_3 and R_4 are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

R_5 and R_{10} are independently is selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups;

further wherein

the terpolymer includes at least one acid labile group and the first α -fluorinated acrylate monomer and the second α -fluorinated acrylate monomer are different.

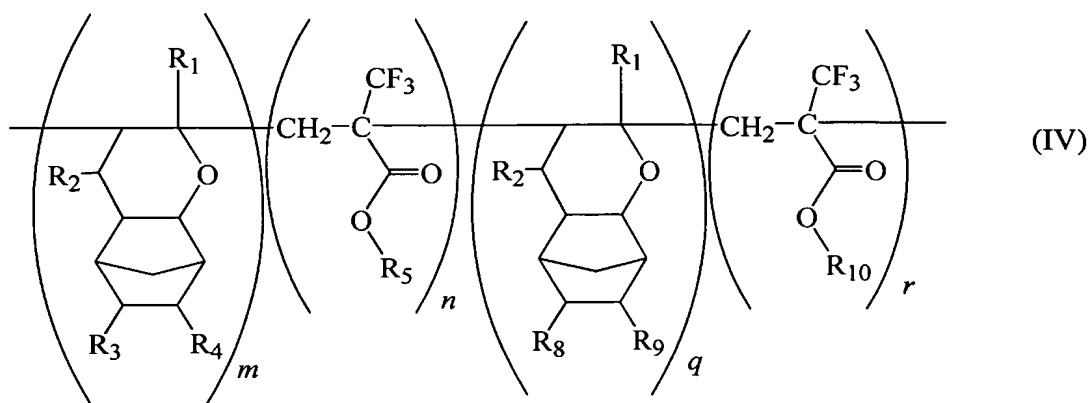
25. A photosensitive terpolymer according to claim 24, wherein:

$m / (m + n)$ is between about 0.3 and 0.5.

26. A photosensitive terpolymer according to claim 24, wherein:

the acid labile group is selected from a group consisting of t-butyl, substituted cyclohexyl, 1-methyl-1-cyclohexyl, 1-ethyl-1-cyclohexyl, 2-methyl-2-norbornyl, 2-ethyl-2-norbornyl, 2-methyl-2-isobornyl, 2-ethyl-2-isobornyl, 8-methyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 8-ethyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, 1-adamantyl-1-methylethyl, 2-methyl-2-fenchyl and 2-ethyl-2-fenchyl groups.

27. A photosensitive terpolymer according to claim 24, wherein:
at least one half of the haloalkyls included in the copolymer are fluoralkyls.
28. A photosensitive terpolymer according to claim 24, wherein:
the terpolymer has a Mw of between about 8,000 and 25,000; and
a polydispersity of between about 1.6 and about 2.5.
29. A photosensitive copolymer according to claim 24, wherein:
the copolymer has a Mw of between about 10,000 and 15,000; and
a polydispersity of between about 1.8 and about 2.3.
30. A photosensitive tetrapolymer including first and second α -fluorinated acrylate monomers and first and second alkenyl ether monomers having the formula IV



wherein

$$m + n + q + r = 1;$$

$$m + q = n + r;$$

$$0.01 \leq m / (m + q) \leq 0.8;$$

$$0.01 \leq n / (n + r) \leq 0.8;$$

R_1 and R_2 are independently selected from a group consisting of hydrogen and methyl;

R_3 , R_4 , R_8 and R_9 are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

R_5 and R_{10} are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

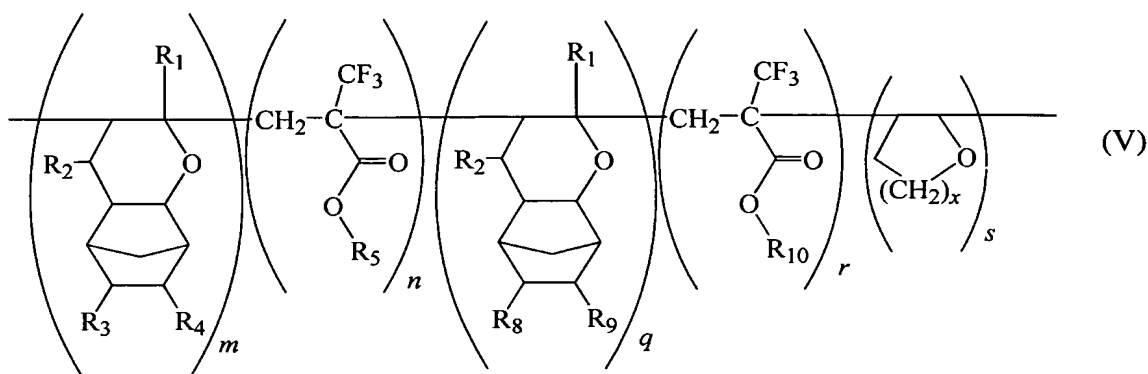
further wherein

the tetrapolymer includes at least one monomer that includes an acid labile group,

the first alkenynl ether monomer and the second alkenynl ether monomer are different, and

the first and second α -fluorinated acrylate monomers are different.

31. A photosensitive tetrapolymer according to claim 30, wherein:
 $m / (m + q)$ is between about 0.3 and 0.5.
32. A photosensitive tetrapolymer according to claim 30, wherein:
the acid labile group is selected from a group consisting of t-butyl, substituted cyclohexyl, 1-methyl-1-cyclohexyl, 1-ethyl-1-cyclohexyl, 2-methyl-2-norbornyl, 2-ethyl-2-norbornyl, 2-methyl-2-isobornyl, 2-ethyl-2-isobornyl, 8-methyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 8-ethyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, 1-adamantyl-1-methylethyl, 2-methyl-2-fenchyl and 2-ethyl-2-fenchyl groups.
33. A photosensitive tetrapolymer according to claim 30, wherein:
the tetrapolymer has a Mw of between about 10,000 and 20,000; and
a polydispersity of between about 1.7 and about 2.5.
34. A photosensitive tetrapolymer according to claim 30, wherein:
the copolymer has a Mw of between about 13,000 and 19,000; and
a polydispersity of between about 1.8 and about 2.2.
35. A photosensitive pentapolymer including first and second α -fluorinated acrylate monomers, first and second alkenyl ether monomers and a dihydrofuran having the formula V:



wherein

x is 1 or 2;

$m + n + q + r + s = 1$;

$m + q + s = n + r$;

$0.01 \leq m / (m + q + s) \leq 0.8$;

$0.01 \leq n / (n + r) \leq 0.8$;

$0.01 \leq q / (m + q + s) \leq 0.8$; and

R_1 and R_2 are independently selected from a group consisting of hydrogen and methyl;

R_3 , R_4 , R_8 and R_9 are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

R_5 and R_{10} are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

further wherein

the tetrapolymer includes at least one monomer that includes an acid labile group,

the first alkenyl ether monomer and the second alkenyl ether monomer are different,

and

the first and second α -fluorinated acrylate monomers are different.

36. A photosensitive pentapolymer according to claim 35, wherein:

$m / (m + q + s)$ is between about 0.3 and 0.5; and

$q / (m + q + s)$ is between about 0.3 and 0.5.

37. A photosensitive pentapolymer according to claim 35, wherein:

$m / (m + q + s)$ is between about 0.3 and 0.5; and

$s / (m + q + s)$ is between about 0.3 and 0.5.

38. A photosensitive pentapolymer according to claim 35, wherein:

the acid labile group is selected from a group consisting of t-butyl, substituted cyclohexyl, 1-methyl-1-cyclohexyl, 1-ethyl-1-cyclohexyl, 2-methyl-2-norbornyl, 2-ethyl-2-norbornyl, 2-methyl-2-isobornyl, 2-ethyl-2-isobornyl, 8-methyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 8-ethyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, 1-adamantyl-1-methylethyl, 2-methyl-2-fenchyl and 2-ethyl-2-fenchyl groups.

39. A photosensitive pentapolymer according to claim 35, wherein:

the pentapolymer has a Mw of between about 7,000 and 25,000; and

a polydispersity of between about 1.7 and about 2.5.

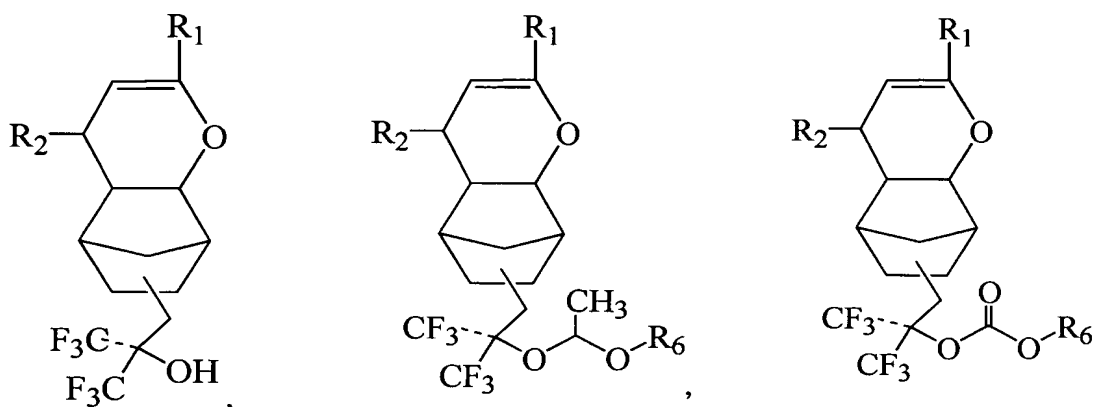
40. A photosensitive pentapolymer according to claim 35, wherein:

the copolymer has a Mw of between about 12,000 and 19,000; and

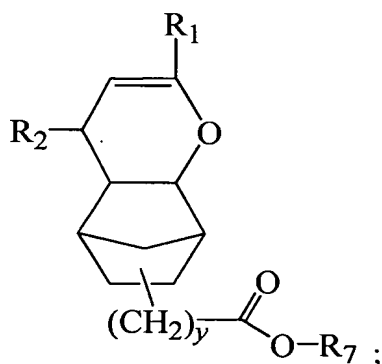
a polydispersity of between about 1.8 and about 2.3.

41. A method of forming a photosensitive polymer comprising:

combining at least one alkenyl ether monomer selected from the group consisting of alkenyl ether monomers represented by the formulas:



and



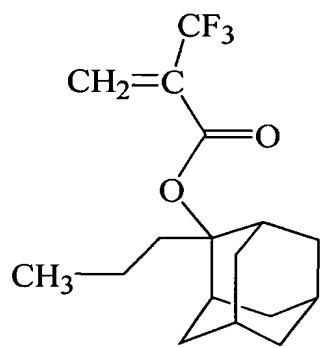
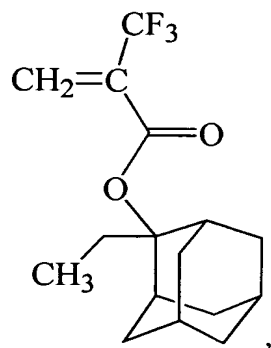
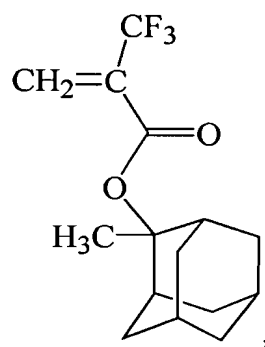
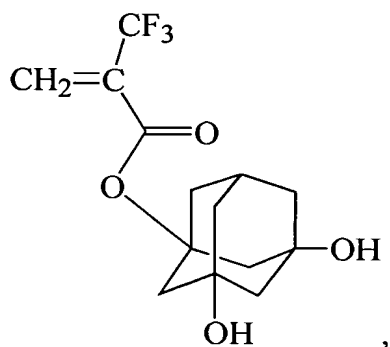
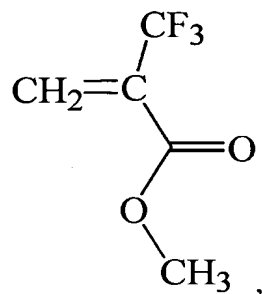
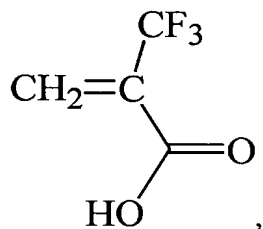
wherein

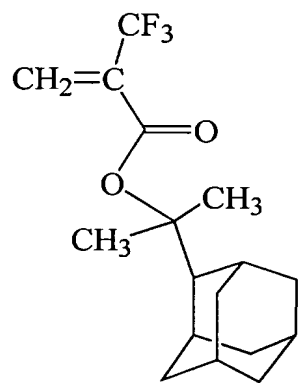
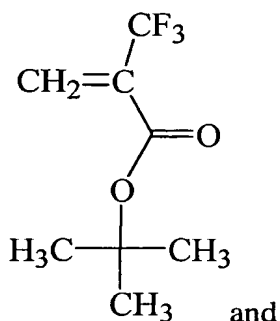
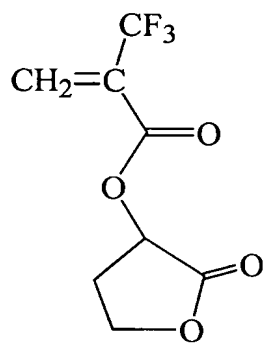
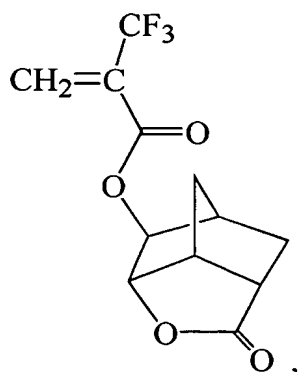
y is 0, 1 or 2;

R_6 is selected from a group consisting of alkyls and substituted alkyls having at least one and no more than 20 carbon atoms; and

R₇ is an acid labile group including a hydrocarbon or a substituted hydrocarbon having at least 4 and no more than 20 carbons; and

a substituted or unsubstituted α-fluorinated acrylate monomer selected from the group represented by the formulas:



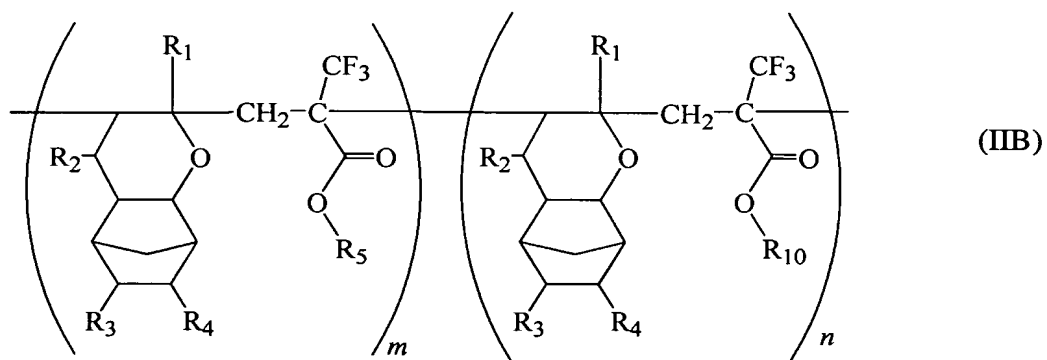
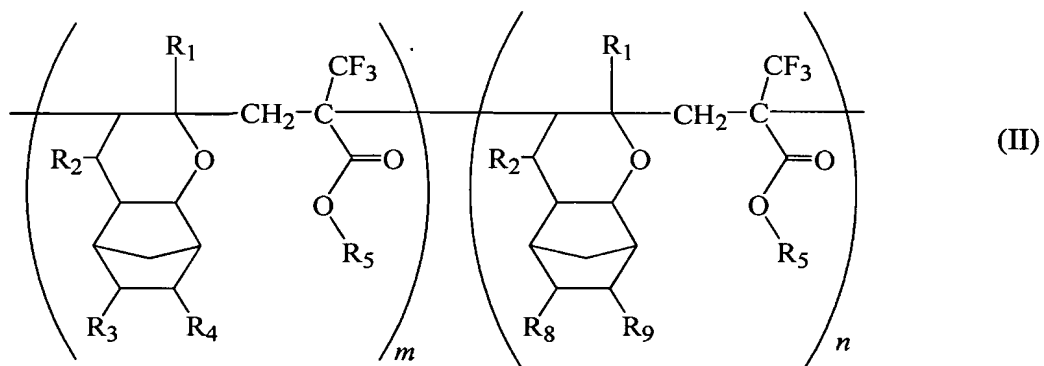
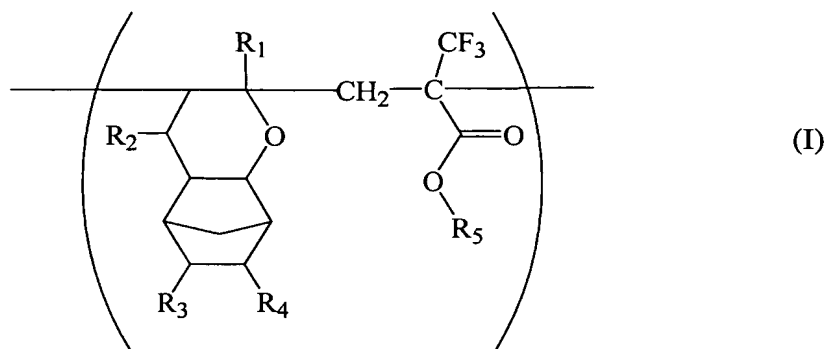


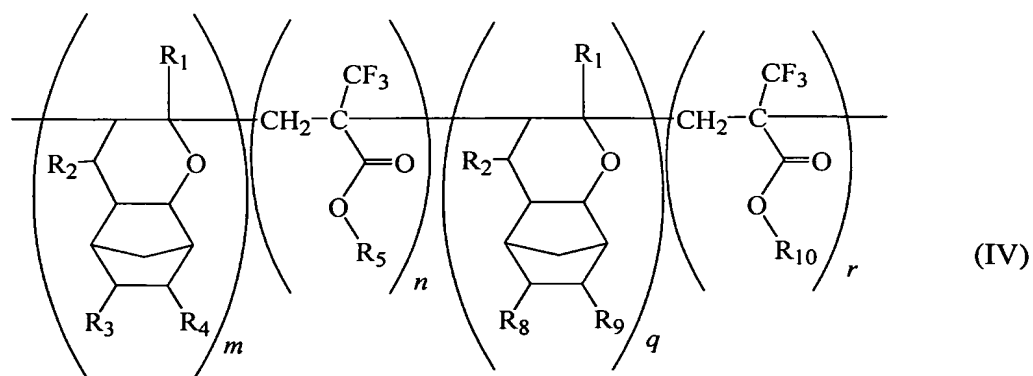
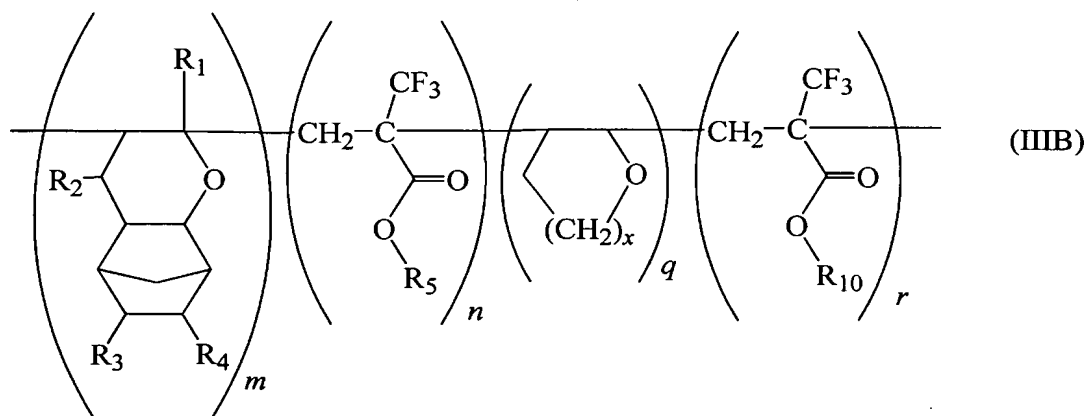
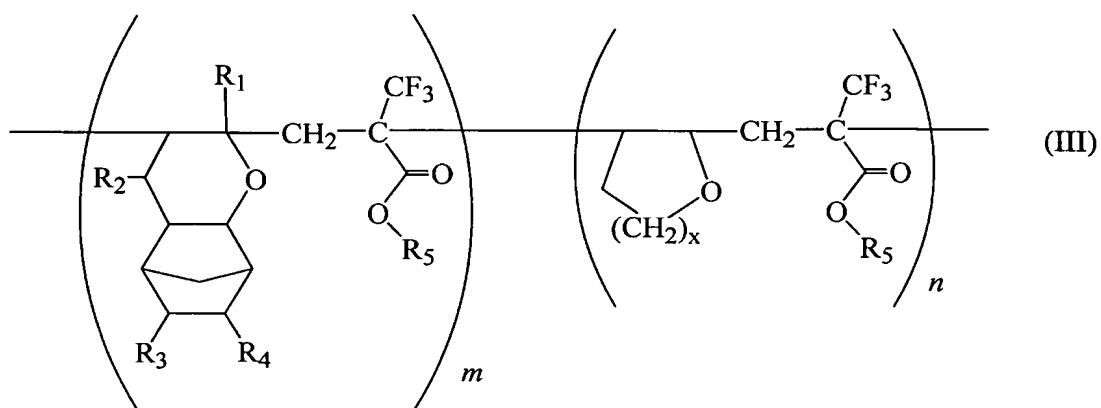
in a solvent to form a polymerization solution, the polymerization solution being substantially free of heavy metals;

heating the polymerization solution to a polymerization temperature for a polymerization period sufficient to cause the radical polymerization of the α -fluorinated acrylate and alkenyl ether monomers.

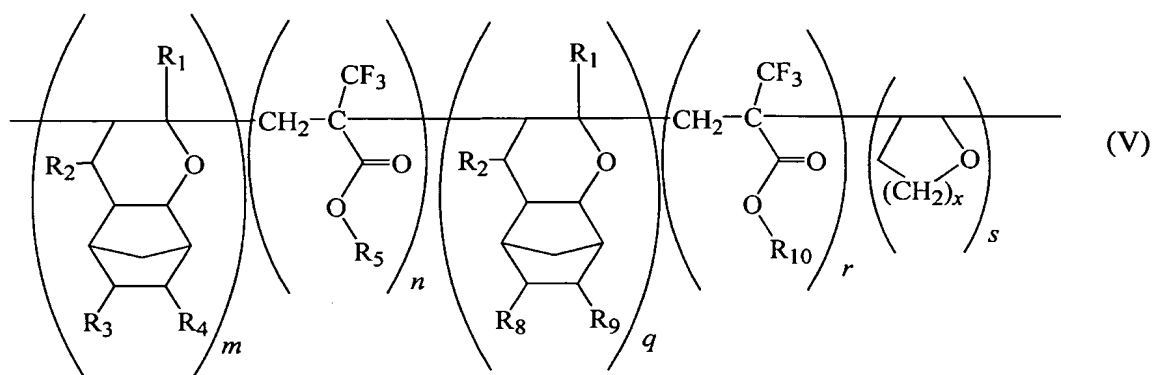
42. A method of forming a photosensitive polymer according to claim 41, wherein:
 - the solvent includes THF and AIBN;
 - the polymerization temperature is at least 50 °C.;
 - the polymerization time is at least 1 hour; and
 - the photosensitive polymer has a Mw of at least about 3,000 and a polydispersity of less than about 3.

43. A method of forming a photosensitive polymer according to claim 42, wherein:
- the AIBN is present in an amount less than about 5 mol% based on the monomers;
 - the polymerization temperature is at least 65 °C.;
 - the polymerization time is at least 4 hours; and
 - the photosensitive polymer has a Mw of at least about 5,000 and a polydispersity of less than about 2.5.
44. A method of forming a photosensitive polymer according to claim 41, further comprising:
- precipitating the polymer from the polymerization solution to obtain a precipitate;
 - dissolving the precipitate in THF to form a polymer solution;
 - precipitating the polymer from the polymer solution to obtain a second precipitate;
- and
- drying the second precipitate.
45. A photoresist composition suitable for forming patterns having a line/space pattern of less than 0.25 μm when exposed to light having a wavelength of 157 nm comprising:
- a photosensitive polymer represented by a formula selected from a group consisting of





and



wherein

x is 1 or 2;

$m + q + s = n + r$

R_1 and R_2 are independently selected from a group consisting of hydrogen and methyl;

R_3 , R_4 , R_8 and R_9 are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

R_5 and R_{10} are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

further wherein the polymer includes at least one monomer including an acid labile group; and

a solvent.

46. A photoresist composition according to claim 45, wherein:

the acid labile group is selected from a group consisting of t-butyl, substituted cyclohexyl, 1-methyl-1-cyclohexyl, 1-ethyl-1-cyclohexyl, 2-methyl-2-norbornyl,

2-ethyl-2-norbornyl, 2-methyl-2-isobornyl, 2-ethyl-2-isobornyl, 8-methyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 8-ethyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, 2-methyl-2-adamantyl, 2-ethyl-2-adamantyl, 1-adamantyl-1-methylethyl, 2-methyl-2-fenchyl and 2-ethyl-2-fenchyl groups.

47. A photoresist composition according to claim 45, wherein:
the photosensitive polymer has a Mw of between about 3,000 and 100,000; and
a polydispersity of between about 1.5 and about 3.0.
48. A photoresist composition according to claim 45, wherein:
the photosensitive polymer includes at least two different photosensitive polymers,
each of which has a Mw of between about 3,000 and 100,000; and
a polydispersity of between about 1.5 and about 3.0.
49. A photoresist composition according to claim 45, wherein:
the photosensitive polymer has a Mw of between about 7,000 and 25,000; and
a polydispersity of between about 1.7 and about 2.3.
50. A photoresist composition according to claim 45, further comprising:
a photoacid generator (PAG).
51. A photoresist composition according to claim 50, wherein:
the photoacid generator includes a compound selected from a group consisting of
triarylsulfonium salts, diaryliodonium salts, sulfonates and mixtures thereof.

52. A photoresist composition according to claim 51, wherein:

the photoacid generator includes a compound selected from a group consisting of triphenylsulfonium triflate, triphenylsulfonium antimonate, diphenyliodonium triflate, diphenyliodonium antimonate, methoxydiphenyliodonium triflate, di-t-butyl diphenyliodonium triflate, 2,6-dinitrobenzyl sulfonates, pyrogallol tris(alkylsulfonates), N-hydroxysuccinimide triflate, norbornene-dicarboximide-triflate, triphenylsulfonium nonaflate, diphenyliodonium nonaflate, methoxydiphenyliodonium nonaflate, di-t-butyl diphenyliodonium nonaflate, N-hydroxysuccinimide nonaflate, norbornene-dicarboximide-nonaflate, PFOS (triphenylsulfonium perfluorooctanesulfonate), diphenyliodonium PFOS, methoxydiphenyliodonium PFOS, di-t-butyl diphenyliodonium triflate, N-hydroxysuccinimide PFOS, norbornene-dicarboximide PFOS and mixtures thereof.

53. A photoresist composition according to claim 51, wherein:

the photoacid generator comprises between about 1-30 wt% of the photoresist composition based on the photosensitive polymer.

54. A photoresist composition according to claim 45, further comprising:
an organic base.

55. A photoresist composition according to claim 54, wherein:

the organic base includes a tertiary amine compound.

56. A photoresist composition according to claim 55, wherein:

the organic base includes one or more tertiary amine compounds selected from a group consisting of triethylamine, triisobutylamine, triisooctylamine, triisodecylamine, diethanolamine, triethanolamine, N-alkyl substituted pyrrolidinone, N-alkyl substituted caprolactam, N-alkyl substituted valerolactam and mixtures thereof.

57. A photoresist composition according to claim 56, wherein:

the organic base is present at a concentration of about 0.01 to 2.0 wt% based on the photosensitive polymer.

58. A photoresist composition according to claim 45, further comprising:

at least one surfactant.

59. A photoresist composition according to claim 58, wherein:

the surfactant is present within the photoresist composition in an amount between about 30 to 200 ppm.

60. A photoresist composition according to claim 47, further comprising:

between about 1 and 30 wt% of a photoacid generator (PAG) selected from a group consisting of triphenylsulfonium triflate, triphenylsulfonium antimonate, diphenyliodonium triflate, diphenyliodonium antimonate, methoxydiphenyliodonium triflate, di-t-butyl diphenyliodonium triflate, 2,6-dinitrobenzyl sulfonates, pyrogallol tris(alkylsulfonates), N-hydroxysuccinimide triflate, norbornene-dicarboximide-triflate, triphenylsulfonium nonaflate, diphenyliodonium nonaflate, methoxydiphenyliodonium nonaflate, di-t-butyl diphenyliodonium nonaflate, N-hydroxysuccinimide nonaflate, norbornene-dicarboximide-nonaflate, PFOS (triphenylsulfonium perfluorooctanesulfonate), diphenyliodonium PFOS, methoxydiphenyliodonium PFOS, di-t-butyl diphenyliodonium triflate, N-hydroxysuccinimide PFOS, norbornene-dicarboximide PFOS and mixtures thereof;

between about 0.01 and 2 wt% of an organic base selected from a group consisting of triethylamine, triisobutylamine, triisooctylamine, triisodecylamine, diethanolamine,

triethanolamine, N-alkyl substituted pyrrolidinone, N-alkyl substituted caprolactam, N-alkyl substituted valerolactam and mixtures thereof; and

between about 30 and 200 ppm surfactant.

61. A photoresist composition according to claim 45, wherein:

the photoresist composition is capable of forming patterns having line/space sizing of 0.25 μm or less when exposed to light having a wavelength of 157 nm at a light intensity of between about 10 and 30 mJ/cm^2 .

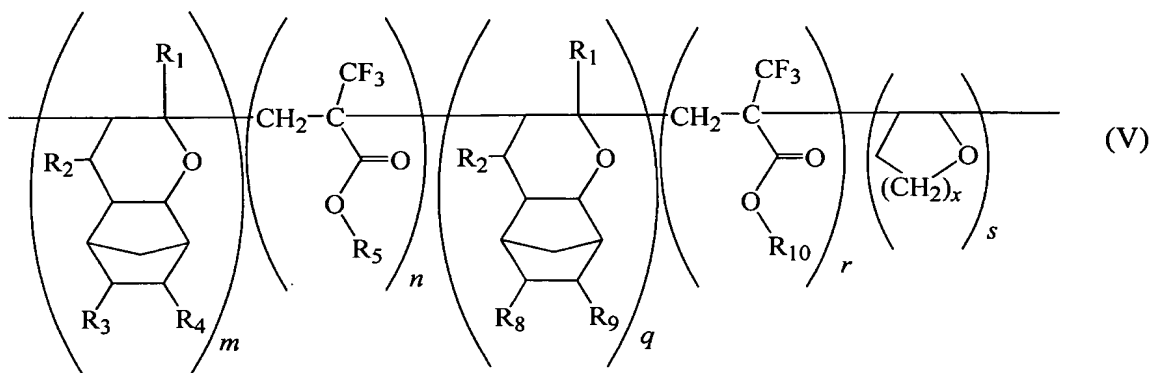
62. A photoresist composition according to claim 61, wherein:

the photoresist composition is capable of forming patterns having line/space sizing of 0.15 μm or less when exposed to light having a wavelength of 157 nm at a light intensity of between about 10 and 30 mJ/cm^2 .

63. A photoresist composition according to claim 61, wherein:

the photoresist composition is capable of forming patterns having line/space sizing of about 0.11 μm or less when exposed to light having a wavelength of 157 nm at a light intensity of between about 10 and 30 mJ/cm^2 .

64. A photosensitive polymer including at least one α -fluorinated acrylate monomer and at least one alkenyl ether monomer having the formula V:



wherein

x is 1 or 2;

$m + n + q + r + s = 1$;

$m + q + s = n + r$;

$0.01 \leq m / (m + q + s) \leq 0.8$;

$0.01 \leq n / (n + r) \leq 0.8$;

$0 \leq q / (m + q + s) \leq 0.8$; and

$0 \leq r / (n + r) \leq 0.8$;

$0 \leq s / (m + q + s) \leq 0.8$; and

R_1 and R_2 are independently selected from a group consisting of hydrogen and methyl;

R_3 , R_4 , R_8 and R_9 are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

R_5 and R_{10} are different and are independently selected from a group consisting of hydrogen, hydroxy, alkyl, cycloalkyl, haloalkyl, alkoxy, carboxyl, carbonyl, ester and acid labile groups; and

further wherein

the photosensitive polymer includes at least one monomer that includes an acid labile group.

65. A photosensitive polymer according to claim 64, wherein:

each acid labile group is selected from a group consisting of substituted and unsubstituted t-butyl, substituted and unsubstituted cyclohexyl, substituted and unsubstituted heterocyclo, substituted and unsubstituted 1-methyl-1-cyclohexyl, substituted and unsubstituted 1-ethyl-1-cyclohexyl, substituted and unsubstituted 2-methyl-2-norbornyl, substituted and unsubstituted 2-ethyl-2-norbornyl, substituted and unsubstituted 2-methyl-2-isobornyl, substituted and unsubstituted 2-ethyl-2-isobornyl, substituted and unsubstituted 8-methyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, substituted and unsubstituted 8-ethyl-8-tricyclo[5.2.1.0^{2,6}]decanyl, substituted and unsubstituted 2-methyl-2-adamantyl, substituted and unsubstituted 2-ethyl-2-adamantyl, substituted and unsubstituted 1-adamantyl-1-methylethyl, substituted and unsubstituted 2-methyl-2-fenchyl and substituted and unsubstituted 2-ethyl-2-fenchyl groups.

66. A photosensitive polymer according to claim 64, wherein:

the photosensitive polymer includes a mixture of at least two different photosensitive polymers, each of which has a Mw of between about 3,000 and 100,000; and
a polydispersity of between about 1.5 and about 3.0.

67. A photoresist composition according to claim 64, wherein:

the photosensitive polymer has a Mw of between about 7,000 and 25,000; and
a polydispersity of between about 1.7 and about 2.3.